



# Newsletter

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September - October 1985

## Director's Note

The Institute of Ecosystem Studies enters its third year this fall. During our first two years, we have expanded and improved our research facilities, installed new scientific equipment and added new staff. New education programs have been introduced and new research begun.

This issue of the Newsletter describes some of these activities and introduces a number of new staff members. We plan to focus on their research in future issues.

The IES Newsletter is published by the Institute of Ecosystem Studies at the Mary Flagler Cary Arboretum. Located in Millbrook, New York, the Institute is a division of The New York Botanical Garden. All newsletter correspondence should be addressed to the Editor.

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*At the Cary Conference, left to right, IES Director Gene E. Likens with distinguished ecologists Drs. Howard T. Odum and Eugene P. Odum, brothers, and Dr. William E. Odum, Eugene's son.*

## Cary Conference on the Status and Future of Ecosystem Science

There are many different ways of approaching and interpreting the science of ecology today. Do these diverse approaches represent a healthy competition or should the community of ecologists try to reach a consensus to enable a "quantum jump" in the understanding and management of natural ecosystems?

This was one of the questions posed by Dr. Gene Likens, Director of the Institute of Ecosystem Studies, in his opening address at the Cary Conference on the Status and Future of Ecosystem Science. This Conference was attended by sixty prominent researchers and educators -- including twelve IES staff scientists -- from twenty states and an additional six nations, who met at the Mary Flagler Cary Arboretum from April 28th to May 1st, 1985. The Conference represented the first such gathering of ecologists to review the state of the science, and brought together many of the world's foremost experts in the field. Funding was provided by the Mary Flagler Cary Charitable Trust and the National Science Foundation.

Dr. Likens chaired the Conference's steering Committee; joining him were Dr. Barbara L. Bedford (Cornell University), Dr. Kenneth Cummins (University of Maryland), Dr. John E. Hobbie (The Ecosystems Center, Marine Biological Laboratory) and Dr. William A. Reiners (University of Wyoming). The participants were welcomed by Dr. James M. Hester, President of The New York Botanical Garden, and by Dr. Likens. In his introductory remarks, Dr. Likens said "We are proud of the facilities and resources at the Institute. We want this meeting to be a comfortable and memorable experience, but most important a significant event in ecology." He went on to state the goal of the Conference: to take "a philosophical look at where we are and where we want to go as an intellectual, scientific discipline." Speakers in the three morning plenary sessions presented an overview of ecosystem science, concentrating on history,

current research issues and, on the final day, an outlook for the coming decade. Small discussion groups explored these topics and others in afternoon and evening sessions. In addition, participants were given tours of the Institute's laboratory and field facilities, conducted by John Eaton, Laboratory Manager, and Ray Winchcombe, Manager of Field Research Facilities.

Specific questions were addressed by the Conference — among these:

- ... What are the important differences between an ecosystem, a landscape, a biosphere?
- ... Is an understanding of the whole really more informative than the sum of its parts?
- ... What are the important interfaces between population, community and ecosystem ecology? How do these interfaces influence the development of ecosystem theory?
- ... Is information from ecosystem science, particularly ecosystem theories, useful to problems of the real world? Is the information being used?

Each of the discussion groups developed a series of recommendations regarding the status and future of ecosystem science. Stressed were the needs for integrating the various schools of thought within the field, for improving educational and job opportunities for ecosystem ecologists, and for impressing upon the public the importance of ecology in today's complex world. There was consensus that experimental studies of entire ecosystems as well as long-term observations will be required for a full understanding of natural ecosystems. Finally, the conferees confirmed that humans are important components of or otherwise affect all major ecosystems.

The proceedings were videotaped, and rapporteurs kept detailed notes on all the meetings. This valuable information will

*(continued on page 4)*

## Wet Spots for Animal Studies

It would come as no surprise to most people to read that there are many species of microscopic animals living in freshwater ponds and streams. But are they also aware of the variety of animal life present in groundwater?

"Groundwater" is any water *under* the surface of the earth, for example, water in aquifers tapped by man-made wells. This groundwater comes to the surface in seeps, springs and stream banks where the water flows through the ground to the streams. Present in this water are animals whose natural habitats are the tiny 'interstitial' spaces between soil and rock particles. Dr. David Strayer, aquatic ecologist at the Institute of Ecosystem Studies (see article below), and his assistant Eileen Bannon, are investigating as many of these subsurface wet areas as they can to learn more about the interstitial fauna of this region.

Almost no work on the fauna of groundwater has been done in North America, although there has been a great deal of research carried out in Europe. The European scientists found these creatures fascinating for several reasons. In the first place, their shape was intriguing: whereas most microscopic aquatic animals have varying shapes, these interstitial creatures were elongated and skinny - an adaptation to their life in tiny 'cave' habitats. And even more interesting, they represent a whole group

of animals which was new to science. Many had no living relatives in freshwater ponds or streams...but they did have relatives in marine beach sand. Their ancestors must have migrated, underground, into fresh water habitats.

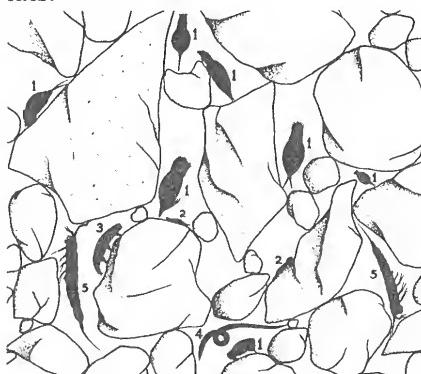


Illustration of a small portion of a freshwater sandy beach showing relative size of sand grains and some common interstitial animals. (From Pennak, 1939.)

Dr. Strayer became interested in freshwater interstitial animals for the same reasons which sparked the curiosity of the European scientists, and to his knowledge there is only one other scientist in North America currently studying these animals. Another aspect of Dr. Strayer's research is to determine the relationship between groundwater quality — whether or not it is polluted — and the composition of the animals

present in that groundwater. In other words, is there any way in which we can sample the animal life simply and inexpensively and thus draw conclusions about how clean the water is? Related to this, then, would be the question of whether contaminants can be broken down naturally by these tiny organisms.

Collecting the animals — most of which are no larger than 1 mm (1/25th of an inch) — is done in three ways, depending on the type of area being sampled. Animals in the deep wells are trapped in a small, fine-mesh net lowered into the water, and as the net is retrieved it sieves out anything in its path. In areas of wet ground a hole may be dug; water which seeps into the hole is filtered through a fine-mesh. Finally, a "well-point", which is a sharply pointed pipe with small holes near the tip, may be hammered into the ground and a hand pump used to obtain a sample which is then filtered to collect the tiny animals.

Hundreds of different species of interstitial animals from approximately ten phyla can be found locally. A sample from shallow groundwater might contain several hundred organisms representing a few dozen species. The majority of these animals are shrimp-like crustaceans (Phylum Arthropoda), many of which are probably previously undiscovered. The research being conducted by Dr. Strayer and Ms. Bannon should solve many of the mysteries concerning the biology, ecology and taxonomy of this fascinating group.

## Scientific Staff Promotions

**CHARLES D. CANHAM**, Plant Ecologist. Dr. Canham has been promoted to Assistant Scientist at the Institute. He has done studies of plant growth at the Arboretum, both in the greenhouse and in the field, since January 1984 when he was appointed Postdoctoral Associate. His current research concerns the effects of soil moisture and available light on forest composition and the conditions under which some species of shrubs naturally prevent tree growth on power line rights-of-way. At the same time he is compiling

information (vegetation composition and structure, current management, and previous land use history) on the upland fields of the Arboretum.



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**DAVID L. STRAYER**, Aquatic Ecologist. Dr. Strayer has been promoted to Assistant Scientist. He began at the IES as a Postdoctoral Associate in September 1983, studying freshwater habitats on and around the Arboretum, and is currently involved in research on groundwater fauna (see article above), freshwater mollusks of the Hudson River Basin, and nutrient limitation of algal growth in the East Branch of Wappingers Creek.

## New Staff

In late 1984, the Institute advertised for new scientific staff to expand the in-house research program. Review of over 300 applications resulted in the appointment of five Assistant Scientists including Drs. Canham and Strayer. The new scientific staff members are Stuart Findlay and Gary Lovett, who joined the IES research team in late summer, and Michael Pace who will arrive at the Institute early in 1986.

**STUART FINDLAY**, Aquatic Ecologist. Dr. Findlay obtained his Ph.D. at the Skidaway Institute of Oceanography and did his postdoctoral studies at the University of Georgia's Institute of Ecology. At the Institute he will investigate the rate of detritus supply (specifically leaf litter) and its consumption by stream insects in various aquatic ecosystems. His research will be carried out in the East Branch of Wappingers Creek.



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*continued...*

## New Staff *continued...*

**GARY M. LOVETT,** Plant Ecologist. Dr. Lovett, with a Ph.D. from Dartmouth College, did his post-doctoral work at the Oak Ridge National Laboratory in Tennessee. His research on nutrient cycling in forests will concentrate on the dry deposition of pollutants (as opposed to deposition by precipitation) and interaction between the atmosphere and the forest canopy. His field work will be done at the Arboretum and at a high-elevation site, not yet selected, in the Northeast.



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In addition, two Postdoctoral Associates have been appointed:

**JEFF S. GLITZENSTEIN,** Terrestrial Ecologist. Dr. Glitzenstein, who joined the IES staff in September, obtained his Ph.D. from Rice University. At the Institute he is using measurements of tree ring width to analyze the history of disturbance and tree population dynamics in



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the Cary Forest. Of particular interest will be the effect of land use history and physical factors on patterns of regeneration and relative growth of tree species after disturbance.

**GEOFFREY G. PARKER,** Forest Ecologist. Dr. Parker obtained his Ph.D. at the University of Georgia and has been at the Institute since April. Among his research interests are the interactions between forest canopies and atmospheric deposition, including studies of the acid-buffering capacity of tree leaves, and studies of water and nutrient losses following deforestation of lowland rainforest in Costa Rica.



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The Education Program, located at the Gifford House Visitor and Education Center, is expanding in new directions with the addition of two staff members during the summer:

**ALAN R. BERKOWITZ,** Head of Education and Research Associate. A scientist with a doctorate in Agricultural Ecology from Cornell University and interest and experience in environmental education, Dr. Berkowitz has been named Head of Education. He will be expanding the Institute's education programs, including

the evening courses, community education and student internships, and will be coordinating the development of a new series of brochures and displays to inform the public about the ecology of the area and relevant research being done here. In addition, he conducts his own research on the ecological aspects of different fertilization treatments on corn, and various uses of perennial sods (grasses and/or clovers) in annual row crops such as beans and corn, and perennial crops such as apples.



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**JILL CADWALLADER,** Senior Staff Assistant. Dividing her time between the Education and Public Relations Programs at the Institute, Jill Cadwallader is responsible for communications. She received an A.B. in Biology from Clark University (Massachusetts), and recently moved to New York from Bermuda where she had worked at the Bermuda Biological Station for Research, Inc. in areas ranging from oil pollution research to public relations and administration.

## Cary Summer Fellows, 1985: Young Scientists Funded

Each year the Institute of Ecosystem Studies provides a Cary Summer Fellowship to enable one or more scientists to conduct independent research at the Institute's laboratories over the summer. Typically the recipients are at an early stage in their careers and find themselves having to forego research time to meet teaching and related commitments at their home institutions. With IES support, the Cary Fellows can pursue a research project from start to finish within a given time frame; insights gained from this research are then incorporated into their teaching programs.

During summer 1985 the Institute welcomed two Cary Fellows:

Dr. Thomas R. Lynch is Associate Professor of Biology at the New Mexico Institute of Mining and Technology. His research as a Cary Fellow dealt with aquatic insects and their substrate preferences, and his field site was a section of the lowland area of the East Branch of Wappingers Creek, on the Arboretum property. A preliminary examination of his data showed that the more common insect species in the samples — three genera of mayflies and two of stoneflies — preferred a gravel substrate over pebble or sand for colonization. Dr. Lynch has shipped a large quantity of samples back to his lab in New Mexico, where undergraduate students will be employed to as-

sist with the isolation of organisms from the test substrates.

Dr. Joanna Pijanowska came to the Institute from Poland, where she is Associate Professor in the Department of Hydrobiology, Zoological Institute, University of Warsaw. Her interest is the zooplankton of acid lakes — lakes in which the pH (measure of acidity or alkalinity) is somewhat lower than the neutral pH level of 7. As study sites she selected two small lakes in the Shawangunk Mountains: Lake Mohonk is neutral with a pH of approximately 6.7, and Awosting Lake, in which there have been no fish for 50 years, is acid with a pH of 4.7. (It is interesting to note here that, although the lakes are close to each other and have therefore been exposed to the same external factors, they differ tremendously in their abilities to neutralize acidity.) Zooplankton usually swim up or down in a lake as a defense mechanism against predation by fish: they spend daylight hours in the deeper, waters and migrate to the surface at night to feed. Dr. Pijanowska hypothesized that the absence of fish in the acid lake might change the animals' behavior patterns and her observations showed this to be true. She found three to four zooplankton species in Awosting Lake, evenly distributed at all depths, whereas the ten species in Mohonk Lake, including one species also found in Awosting, exhibited the typical vertical distribution.

## Dr. Likens Appointed to Environmental Advisory Board

On June 3rd, 1985, New York State Governor Mario M. Cuomo announced the formation of an Environmental Advisory Board. This Board will advise the Executive Chamber and appropriate State departments and agencies in the development and implementation of environmental policies and programs. Dr. Gene Likens, Director of the Institute of Ecosystem Studies and the Mary Flagler Cary Arboretum, was one of nine New York environmental leaders appointed to the Board by the Governor. Also appointed were Pace University Law School Professor Nicholas A. Robinson, chairman; the Honorable Russell W. Peterson, President of the National Audubon Society; Dr. Arthur C. Upton, Director of the Institute of Environmental Medicine at New York University; and representatives from other environmentally concerned agencies.

In his announcement, Governor Cuomo stated that he was "pleased and grateful that such a distinguished group of individuals is willing to lend its experience, knowledge and wisdom to our efforts to develop and implement aggressive and effective environmental initiatives. The environment is the one common ground we all share. Its care and protection is a self-interest for us all. We have done a great deal to protect it but there is much more that needs to be done."

# Charter Members' Tenth Anniversary Dinner

Over seventy individuals have been members of the Mary Flagler Cary Arboretum, without lapse, from the spring of 1975 to 1985. These Charter Members were honored at a special Tenth Anniversary Buffet Dinner held at the Greenhouse on May 7th, 1985.

Joining the guests were Lucille P. Pattison, County Executive of Dutchess County, and Michael Murphy, Assistant to the County Executive and Mayor of the Village of Millbrook. After a reception and dinner acknowledgements were offered by Donald J. Bruckmann, Chairman of the Board of Managers of The New York Botanical Garden; James M. Hester, President of The New York Botanical Garden; Edward A. Ames, Trustee of the Mary Flagler Cary Charitable Trust. The Woodstock Chamber Players provided music in the Greenhouse, beautifully decorated with hanging baskets of begonias, streptocarpus and ivy geraniums, as well as with standing floral displays. Each guest was presented with a small pottery dish, hand-painted with a wildflower design, as a token of appreciation for continuing interest in and support of the Arboretum.

Special thanks went to the Dinner Planning Committee: Sally Gifford O'Brien and Dorothy H. Watson, Co-Chairpersons, and Janice B. Claiborne, Membership Secretary at the Institute.

## Cary Conference (from page 1)

be compiled for use as a permanent educational and reference piece. Dr. Likens hopes to hold similar conferences in the future on an annual or two-year basis, to consider other topics and to provide synthesis and leadership for the field of ecology.

**INSTITUTE OF ECOSYSTEM STUDIES**  
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## Fall Calendar

### COURSES

Course dates, lengths and fees vary. Some are part of longer certificate programs. Descriptions and registration information are highlighted in the Fall 1985 Education Program brochure; members will have received this by mail and non-members should call to request a copy.

Basic Botany

Edible Wild Plants

Dried Flower Workshop

Fundamentals of Gardening

Soil Science

American Indian Traditions in Herbalism

Landscape Design Theory

Construction II: Site Detailing Graphics

Landscape Design III: Planting Design

Sketching for Landscape Design

### HOLIDAY DECORATION WORKSHOPS —

call the number below for details

### ECOLOGICAL EXCURSION

Thursday: November 14, 1985 — The New York Botanical Garden and The Bronx Zoo

Join IES Ecologist Dr. Mark McDonnell exploring the world's exotic environments — all in New York City! Highlights of the trip will be indoor garden displays at the Enid A. Haupt Conservatory, the Bronx Forest ("the only woodland in New York City left uncut since Indian days") and "Jungle World", a newly opened enclosed tropical ecosystems habitat. The deadline for registration is November 1st, 1985.

*For more information, call (914) 677-5359*

### SUNDAY PROGRAMS

Public programs will be offered on the first and third Sundays of each month. All programs run from 2:00 - 4:00 pm and start at the Gifford House. They are open to everyone at no cost. Come prepared for the weather for ecology walks with IES staff scientists on October 6th and 20th and November 3rd and 17th.

### ARBORETUM HOURS

Monday through Saturday, 9 am to 4 pm; Sundays, 1 - 4 pm.

The Gift and Plant Shops are open Tuesday through Saturday 11 am to 4 pm; Sundays 1 - 4 pm. Closed on public holidays. All visitors must obtain a free permit at the Gifford House for access to the Arboretum. Roads closed to vehicles when snow covered and during deer hunting season.

### MEMBERSHIP

Take out a membership in the Mary Flagler Cary Arboretum. Benefits include a special member's rate for IES courses, a 10% discount on purchases from the Gift Shop, free subscription to *GARDEN* (the beautifully illustrated magazine for the enterprising and inquisitive gardener), the IES Newsletter, and parking privileges and free admission to the Enid A. Haupt Conservatory at The New York Botanical Garden in the Bronx. Individual membership is \$25; family membership is \$35. For information on memberships, contact Janice Claiborne at (914) 677-5343.

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